



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
-----------------	-------------	----------------------	---------------------	------------------

10/705,615

11/10/2003

Xiaobo Wang

ACE-00101.P.1.2-US

4696

24232

7590

02/09/2007

DAVID R PRESTON & ASSOCIATES APC

5850 OBERLIN DRIVE

SUITE 300

SAN DIEGO, CA 92121

EXAMINER

BEISNER, WILLIAM H

ART UNIT

PAPER NUMBER

1744

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
--	-----------	---------------

3 MONTHS

02/09/2007

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No. 10/705,615	Applicant(s) WANG ET AL.	
	Examiner William H. Beisner	Art Unit 1744	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 10 November 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-11, 24, 25, 28-30, 32, 36, 43, 44, 49-51 and 60-69 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-11, 24, 25, 28-30, 32, 36, 43, 44, 49-51 and 60-69 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 10 November 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date <u>3/05; 12/05</u> | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Information Disclosure Statement

1. The information disclosure statements filed 3/3/05 and 12/19/05 have been considered and made of record.

Claim Objections

2. Claims 60-69 are objected to because of the following informalities: Claims 60-69 all depend from canceled claims 54 or 58. These claims will be treated on their merits as though they depend from independent claims 24. Appropriate correction is required.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claims 60 and 61 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In claims 60 and 61, "said layer of epithelial cell or endothelial cells" lacks antecedent basis.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

Art Unit: 1744

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35

U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

7. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

8. Claims 1-11, 24, 25, 28, 29, 32 and 49 are rejected under 35 U.S.C. 103(a) as being unpatentable over either Picard (US 2004/0091397) or Tchao (US 5,601,997) in view of Lynes et al.(US 6,723,523).

Both of the references of Picard and Tchao disclose devices for monitoring the migration or invasion of biological particles.

The reference of Picard discloses an upper chamber (114); a lower chamber (116); a biocompatible porous membrane (106) having a porosity sufficient to allow cells to migrate there through and the membrane (106) separates the upper and lower chambers (See Fig. 1B).

The reference of Tchao discloses an upper chamber (24); a lower chamber (22,28); a biocompatible porous membrane (10) having a porosity sufficient to allow cells to migrate there through and the membrane (10) separates the upper and lower chambers (See Fig. 2).

With respect to claim 1, while both of the references of Picard and Tchao disclose the use of optical detection devices (See sensor 120 of Picard and detector 30 of Tchao) for detecting the presence of cells within the lower chamber, the references do not disclose that at least two electrodes are present in the lower chamber for detecting the presence of cells by a change in impedance between the electrodes.

The reference of Lynes et al. discloses that it is known in the art to employ impedance sensing electrodes within a cell or culture space for detecting the presence and/or movement of a cell in response to a chemotactic gradient (See column 9, lines 55-67).

In view of this teaching, it would have been obvious to one of ordinary skill in the art to replace the optical detection systems of the primary references with an impedance measurement system suggested by the reference of Lynes et al. for the known and expected result of providing an alternative means recognized in the art to detect or sense the presence of cells within the lower chambers of the test devices. The reference of Lynes et al. discloses advantages such as improved quantitation of the number of cells (See column 2, lines 58-65).

With respect to claim 2, all of the references disclose that the detection or sensing is performed at the bottom of the chamber.

With respect to claims 3-5, while the references are silent with respect to the surface area for attachment of cells, if not inherently met, it would have been obvious to one of ordinary skill in the art to determine the optimum volumes and surface areas of the test devices while optimizing the results and minimizing the amount of cells and reagents required.

With respect to claim 6, the reference of Lynes et al. discloses the use of impedance analyzer (60).

With respect to claims 7 and 25, the references of Picard and Tchao disclose that the membranes can be made of a polymer material (See paragraph [0029] of Picard and column 6, lines 10-45, of Tchao).

With respect to claim 8, while the references are silent with respect to the thickness of the membrane, if not inherently met, it would have been obvious to one of ordinary skill in the art to determine the optimum thickness while maintaining the structural integrity of the membrane and efficiency of the detection system.

With respect to claims 9, 24, 28 and 29, based on the specifics of the assay to be performed, it would have been obvious to one of ordinary skill in the art to coat the membrane for cell attachment when required.

With respect to claim 10, the reference of Lynes et al. discloses the use of conductive traces and connection devices (See Figure 2).

With respect to claim 11, both the systems of the modified primary references would meet the limitations of claim 11 since both devices are intended to be used for determination of cells moving into the lower chambers.

With respect to claim 32, the pores of the membrane permit the passage of cells.

Art Unit: 1744

With respect to claim 49, the reference of Lynes et al. discloses that an array of electrodes can be employed to detect the presence of cells (See Figure 2).

9. Claims 9, 24, 25, 28, 29, 30, 32 and 60-69 are rejected under 35 U.S.C. 103(a) as being unpatentable over either Picard (US 2004/0091397) or Tchao (US 5,601,997) in view of Lynes et al.(US 6,723,523) taken further in view of Springer et al.(US 5,514,555).

The combination of the references of Picard or Tchao with Lynes et al. has been discussed above.

With respect to the use of a cell adhesion material within the membrane and/or the device, the reference of Springer et al. discloses that it is known to use a membrane coated with collagen (See column 10, lines 47-50).

With respect to the use of a layer of endothelial cells, the reference discloses using a coating of cells of one type on the membrane where a cell of another type passes through the membrane (See column 10, lines 27-67).

In view of this disclosure, it would have been obvious to one of ordinary skill in the art perform the assays disclosed by the reference of Springer et al. in the system of the modified primary reference for the known and expected result of providing an art recognized means for determining the passage of cells from one chamber into the other. As a result, the membrane would include cell adhesion material and include a porosity that prevents the passage of endothelial cells while allows the passage of lymphocytes. Whether the chemoattractant is provided in the upper chamber or lower chamber would have been within the skill of one having ordinary skill in the art while maintaining the function of the device.

With respect to the position of the electrodes, whether the electrodes are positioned on the bottom of the chamber or directly on the lower surface of the membrane would have been entirely within the purview of one having ordinary skill in the art based merely on the size of the chamber employed. One of ordinary skill in the art would recognize that the cell would be detected earlier if provided on the membrane rather than the bottom of the chamber.

10. Claims 36, 43, 44, 50 and 51 are rejected under 35 U.S.C. 103(a) as being unpatentable over either Picard (US 2004/0091397) or Tchao (US 5,601,997) in view of Lynes et al.(US 6,723,523) taken further in view of Ehret et al.(Biosensors).

The combination of the references of Picard or Tchao with Lynes et al. has been discussed above.

Claims 36, 43, 44, 50 and 51 differ by reciting that the electrodes are of the same surface area and/or are interdigitized.

The reference of Ehret et al. discloses that it is known in the art when measuring cell behavior within a culture chamber to employ impedance detection electrodes that are of the same surface area and/or are interdigitized (See Fig. 1).

In view of this teaching, it would have been obvious to one of ordinary skill in the art to employ an impedance detection system as disclosed by the reference of Ehret in the system of the modified primary reference for the known and expected result of providing an alternative means recognized in the art to achieve the same result, measuring cell behavior on a surface by impedance analysis.

Art Unit: 1744

Conclusion

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to William H. Beisner whose telephone number is 571-272-1269. The examiner can normally be reached on Tues. to Fri. and alt. Mon. from 6:15am to 3:45pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gladys J. Corcoran can be reached on 571-272-1214. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



William H. Beisner
Primary Examiner
Art Unit 1744

WHB